

Is Online Learning Able to Effectively Decrease Tuition and Miscellaneous Fees Debt of Higher Education in Taiwan

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As to rapid development of higher education, a majority of higher-education students have been suffering the serious pressure of tuition and miscellaneous fee debt. Therefore, this research utilizes Factor Analysis (FA) approach to analyze the weight-questionnaire of random Taiwanese college students and furthermore, employ Technology Acceptance Model (TAM) and Analytical Network Process (ANP) model to verify interplays and correlations between online learning and Tuition and Miscellaneous Fee Debt (TMFD) through a series of assessed weight-measurements of higher-education students' and experts' questionnaires. As for the increment of research reliability and validity, Fuzzy Set Qualitative Comparative Analysis (fsQCA) method is significantly applied to approve the weight-measurement and evaluate-results. Consequently, the most valuable conclusion is that "online learning is able to passively decrease Tuition and Miscellaneous Fee Debt (TMFD) in higher education (PDTMFD)" that induces the best solution for research topic in order to re-supplies research gap in online learning relative research fields..

Keywords: online learning, tuition and miscellaneous fee debt (TMFD), technology acceptance model (TAM), factor analysis (FA), analytical network process (ANP), fuzzy set qualitative comparative analysis ("fsQCA") method

INTRODUCTION

According to a majority of public Taiwanese long-term requirement for decreasing students' pressure of recruiting examination of higher education ("HE"), Taiwanese education department of Executive Yuan, in 1990s, has commenced to institute new HE policies to authorize not only public universities to set up new departments and colleges but also private universities to settle and operate, such as Chang Jung Christian University (CJCU) founded in 1985, Chung Hua University

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(CHU) founded in 1995, MingDao University (MDU) founded in 1999 and etc. in order to effectively increase recruiting students. Based on the official statistic in the latest annual statistics in 2015 of Taiwanese education department of Executive Yuan (as Table 1), the number of universities has reached 124 in 2014 from the number of 75 in 2004 because Taiwanese education department encouraged colleges to institute more departments and colleges in order to “upgrade” to “comprehensive university” without their professional characteristic considerations. Specifically, as for this developed tendency of Taiwanese HE, the extraordinary increment of Taiwanese HE recruiting rate from approximately 30% in 1996 to 96% in 2014 which means Taiwanese HE schools, including vocational schools, bachelor, master and PhD programs, has recruited around 134,000 students in 2014 in this small island.

Significantly, the high recruiting rate of HE results in not only up to over 620,000 HE students in Taiwan need to applied “student loan” for their TMFD but the total student loan up to over 830,000 million United States Dollar (“USD”) since 2003 based on the latest student load statistic of Department of Education, Executive Yuan in Taiwan as described in Table 1.

Contiguously, in consideration of the latest educational statistic report of Directorate-General of Budget, Accounting and Statistics, Executive Yuan in Taiwan, Tuition and Miscellaneous Fees (Taylor & Darling, 1991) not only in public schools has reached up to approximately 11% but in private schools also has achieved up to around 20% of Gross Domestic Product (“GDP”) per person as described in Table 2; especially, the Taiwanese real wages are decreasing back to real wages in 2000.

METHODOLOGICAL LITERATURES

As following rapidly open revolution of higher education in overall world, a plurality of higher-education students have been enduring a numerous TMFD after their graduation. Currently, a bulk of educational researchers and governments have realize more and more higher-education students have depended on a series of online learning systems to catch academic knowledges as well as empirical experiences through the through diversified 3C devices with IT function services in anytime and anywhere with the lowest expenditures, such as Internet connected fees according to rapid evolution of Internet technology. Specifically, a majority of higher-education students not only download professional knowledge and useful information but also upload individual experiences and personal comments on the internet websites through various 3C devices with IT function services immediately. For this reason, this research employs TAM (Bagozzi, 2007) to analyze the higher-education students’ preferences and behaviors in online learning in order to verify the dependences and interplays between TWFD and online learning because three basic dimensions are applied to evaluate technological user’s “attitude toward using

State of the literature

- The brief concepts of online learning and TMFD of higher education are comprehensively discussed in this research in order to discover the direct interplays between online learning and reduction of TMFD to resupply relative literature gap in relative online learning literature.
- Not only theoretical TAM and analytical ANP models for high research reliability but also FA approach and fsQCA method for high research validity are summarized in this research because diversified applications of these methodologies in online learning is a lack of current literature.

Contribution of this paper to the literature

- The most direct provident is “online learning is able to passively decrease tuition and miscellaneous fees debt (TMFD) in higher education (PDTMFD)” in Taiwanese higher education.
- Connectionization of Course Operation (C-CO), Openness of Course Content (O-CC) and Convenience of Course Operation (C-CP) are the most potentially influenced determinants of online learning means high-education students more focus on connectionization-operation, convenience-operation and course-openness than online learning technological functions during they are taking online learning courses.

Table 1. Developed tendency of Taiwanese HE

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
University	75	89	94	100	102	105	112	116	120	122	124
College	70	56	53	49	45	44	36	32	28	25	21
Vocational School	14	17	16	15	15	15	15	15	14	14	14

Resource: Taiwanese education department of Executive Yuan

Table 2. Taiwanese higher-education student’s loan situation

Year	Students (Person)	Total Student loan (million USD)
2003	679,200	844.46
2004	694,433	883.2
2005	698,408	905.26
2006	728,077	937.36
2005	759,595	954.26
2008	800,809	996.86
2009	817,406	1006.73
2010	777,305	937.43
2011	709,981	884.1
2012	664,895	859.47
2013	621,476	824.4

Resource: Taiwanese education department of Executive Yuan

Table 3. Taiwanese TMEs situation

Year	TMEs / GDP per person	
	% in Public HE institutions	% in Private HE institutions
2003	11.41	21.42
2004	11.18	20.87
2005	10.69	20.31
2006	10.12	19.56
2005	10.27	18.54
2008	10.46	19.23
2009	9.62	19.58
2010	9.52	18.02
2011	9.30	17.82
2012	9.01	17.42
2013	8.54	16.86
2014	8.54	16

Resource: Directorate-General of Budget, Accounting and Statistics, Executive Yuan

(Workman, 2007)” and “behavioral intention (Benbasat & Barki, 2007)” in order to recognize the user’s “actual use behaviors (Chuttur, 2009)” (as Figure 1).

Theses fundamental dimensions are (1) “external variables” can present out of technological considered factor on the level of their using attraction, (2) “perceived usefulness” can reflect concrete technology systems on the level of their performance and (3) “perceived ease of use” can reflect concrete technology

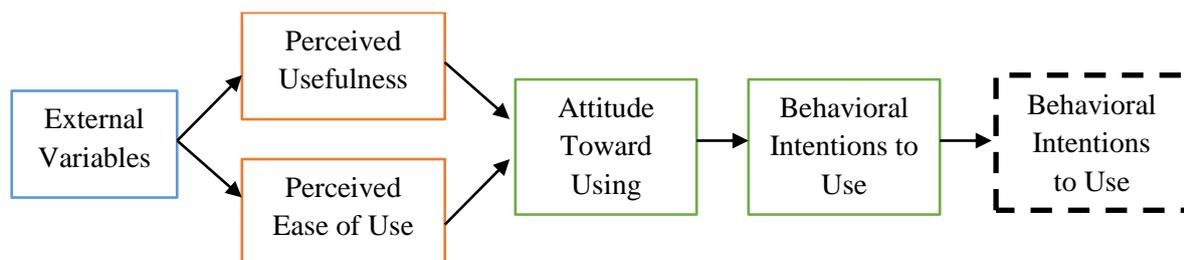


Figure 1. TAM model

systems on the level of their using willing. Consequently, in order to understand the higher-education students' "actual use behaviors" in online learning, educational costs is considered as external variable, learning perceived usefulness is deemed as perceived usefulness and technological perceived ease of use is thought as perceived ease of use of TAM.

As for enhancement of research representativeness, FA was firstly employed for assessments of weight-measurements of random higher-education students' questionnaires because correlation coefficient among each analytical variable to obtain communality of each analytical variable are evaluated in FA (Harman, 1976; Ledesma & Valero-Mora, 2007). Theoretically, exploratory factor and ("EFA") and confirmatory factor analyses were comprehended into FA in order identify and verify segmentation and dimensionality of factor assessed scores of analytical variables. As for statistic calculations of FA, the linear combination equation was

described as $y_k = w_{k1}x_1 + w_{k2}x_2 + \dots + w_{kL}x_L + n_k$ (where (1) K numbers of common potential factors are organized from the L numbers of general influenced factors and (2) the M numbers are more than the K numbers) (Larsen & Warne, 2010).

Furthermore, the directly observed influenced factors were displayed as y_1, y_2, \dots, y_k ; directly unobserved influenced factors are described as x_1, x_2, \dots, x_k and the

constants are showed as w_{ij} (where the factor loading in FA by measuring weights of overall influenced) (Warne & Larsen, 2014). Consequently, after a series of assessed calculations of FA, the analytical factors were able to be systematically classified into correlative evaluated categories. Continuously, in order to induce the best solution for research topic or issue, Analytical Hierarchy Process ("AHP") model has been further applied for effectively increasing reliability and validity, clearly penetrating linguistic amphiboly and efficiently promoting degree of satisfaction in the questionnaires in the current social science research fields. Subsequently, Saaty and Özermir (2005) further delivered Analytical Network Process ("ANP") model to be the new research methodology not only to break through this restricted basic hypothesis through the Delphi method and brainstorm method but also to utilize the positive reciprocal matrix and supermatrix and the more complex hierarchical analyses to induce the results of collection data by means of appraised measurements of relationships between criteria and sub-criteria, internal/external dependency and feedback. Particularly, the Consistency Index ("C.I.", $C.I. = (\lambda_{\max} - n) / (n - 1)$) which is exactly considered in each pairwise matrix and the Consistency Ratio ("C.R.", $C.R. = C.I. / R.I.$, $Rw_i = \lambda_{\max} w_i$, $w_i = \frac{\sum_{j=1}^m (R_{ij} / \sum_{i=1}^m R_{ij}) / m$) were

utilized as identification of each criterion and the two-stage algorithm and specifically, the pairwise comparison matrix can be accepted when the number of C.R. is equal or smaller than 0.01 (Saaty & Vargas, 2006). For strengthening research reliability and validity, fsQCA method of qualitative analysis was further applied to synthetically evaluate linear correlations among each assessed criterion (independent variable; a combination set "in"; X_1, X_2, \dots, X_n) and induced solution (dependent variable; a combination set "out"; Y_1, Y_2, \dots, Y_n) (Mendel & Korjani, 2012). As for evaluated interrelations and dependences between two combination sets "in" and "out", two situations appears: (1) "sufficient analysis" means any a combination set "in" condition "indirectly and probably" and not "directly and compulsory" lead to a combination set "out" condition and (2) "necessarity analysis": any "in" condition is "directly and compulsory" to cause a combination set "out" condition. As to statistics, a simple measure of the "consistency" and "coverage" of sufficient analysis are measured as

consistency $(X_i \leq Y_i) = \sum(\min(X_i, Y_i)) / \sum(X_i)$; coverage $(X_i \leq Y_i) = \sum(\min(X_i, Y_i)) / \sum(Y_i)$ (where “min” indicates the selection of the lower of the two values) (Basurto, 2013). In statistic equations, (1) the consistency score of sufficient analysis is equal to 1 during the X_i values are all less than or equal to their corresponding Y_i values; (2) the consistency score of sufficient analysis is slightly less than 1 which means a few near misses have been appeared and (3) the consistency score of sufficient analysis drops below 0.5 during some X_i values greatly exceeding their corresponding Y_i values. Subsequently, the consistent level of “in” will increase during the numbers of a combination set “in” are bigger than the numbers of a combination set “out” and then, a set of the level of a combination set “in” will be “necessity analysis” to a combination set “out”. Then, the equations of “consistency” and “coverage” of necessity analysis are described as consistency $(X_i > Y_i) = \sum(\min(X_i, Y_i)) / \sum(X_i)$; coverage $(X_i > Y_i) = \sum(\min(X_i, Y_i)) / \sum(Y_i)$ (where (1) all Y_i values are less than or equal to their corresponding X_i values, this equations returns a value of 1 and (2) many Y_i exceed their corresponding X_i values by wide margins, it returns a value less than 0.5) (Blackman, 2013).

Research design

Based on research framework, two phases of questionnaire data were collected in this research and first surveyed questionnaire data gathered from 200 random ED students in Taiwan for analytical assessments of FA approach by means of interviewing in person. As for the least errors of validity and reliability in the Delphi method and expertise brainstorm approach for expert questionnaire collection, Keskin and Metcalf (2011) expressed that the collected questionnaires are, at least, over 10 professional interviewees in the total surveyed data and hence, second questionnaire data obtained from 15 experts, including 5 professors served in Education colleges in Taiwan, 5 scholars served in and 5 researchers served as Taiwanese education government research institutions, through in-person interview for higher research reliability in weight-measurements of ANP model. Briefly, the questionnaire data are surveyed for the pairwise comparisons at each level are evaluated with respect to the related interdependence and importance from equal important (1) to extreme important (5) of Likert’s scales. Subsequently, the ten potential assessed determinants were integrated from the authors’ previous related researches and these determinants are Aggregation Technology Function of Basic Function (“ATF-BC”) (Fournier, Kop, & Sitlia, 2011; Lawless & Richardson, 2002), Course Evaluation Technology Function of Course Function (“CETF-CF”) (Han, Yalvac, Capraro, & Capraro, 2015), Course Professionalization Technology Function of Course Function (“CPTF-CF”) (Kop & Carroll, 2012), Feedback Technology Function of Basic Function (“FTF-BF”) (Kop & Hill, 2008), Re-purposing Technology Function of Basic Function (“RTF-BF”) (Kop, Fournier, & Mak, 2011), Connectionization of Course Operation (“C-CO”) (Hazel, Conrad, & Martin, 1997), Openness of Course Content (“O-CC”) (Yuan, MacNeill and Kraan, 2008), Convenience of Course Operation (“C-CP”) (Hu & Kuh, 2002), Course Complete Rate of Course Assessment (“CCR-CA”) (Kelland, 2006) and User Completely Unrestricted Operation of Course Operation (“UCUO-CO”) (Kember, 1995).

Continuously, this research firstly applied FA approach to assess 183 valid questionnaires of 200 random interviewed higher-education students in Taiwan (Ramsden, 1991; Richardson, 1999; Richardson, Long, & Foster, 2004; Wilson, Lizzio, & Ramsden, 1997) and furthermore, cross-employed theoretical TAM and evaluated ANP models to induce the best solutions of three potential evaluated candidates (Ravenscroft, 2011; Siemens, 2005; Traxler, 2010), consisting of (1)

online learning is able to negatively decrease Tuition and Miscellaneous Fee Debt (“NDTMFD”) in higher education (“NDTMFD”), (2) online learning is able to may decrease Tuition and Miscellaneous Fee Debt (TMFD) in higher education (“MDTMFD”) and (3) online learning is able to passively decrease Tuition and Miscellaneous Fee Debt (TMFD) in higher education (“PDTMFD”). Ultimately, making allowance for the essential research methodology, there are three brief measured steps to be covered into the research measurements and these measured steps are measured step 1: executing FA approach; measured step 2: implementing ANP model and measured step 3: administering fsQCA method.

Measurements

Measured step 1: Executing FA approach

In order to strengthen research representativeness, FA approach was utilized to analyze the weight-questionnaire of random 183 valid ED students in Taiwan. Then, Table 3 describes the mean and standard deviation of analytical questionnaire and significantly, Table 4 expresses that the weight-questionnaire of random 183 analysis N was very suitable for FA approach because Kaiser-Meyer-Olkin measure of sampling adequacy (0.779) is bigger than 0.7 and Significance is bigger than 0.05.

Furthermore, as for inquiring the interactive dependences among ten evaluated criteria, communalities of each ten evaluated criterion were measured in Table 5 and extraordinarily, the three highest communalities of evaluated criteria are CCR-CA (0.759), C-CO (0.728), and O-CC (0.714) because the eigenvalues of these main components (factors) are bigger than 1 for ten evaluated criteria.

Table 4. Descriptive statistic of FA

Questionnaire Items	Questionnaire statistic description		
Gender	Male: 52.46 % (96) Female: 47.54 % (87)		
Utilized experienced years of relative online learning websites	0-1 year: 23.5% (43) 1-2 year: 28.42% (62) More than 2 year: 48.08 % (78)		
Graduation Condition	Use online learning in HE first year: 42.62% (78) Use online learning in HE second year: 22.95% (42) Use online learning in HE third year: 19.13% (35) Use online learning in HE forth year: 15.3% (28)		
Professional Characteristics	Education academic Background: 22.4 % (41) IT academic Background: 48.63 % (89) Business academic Background: 28.97 % (53)		
	Mean	Standard Deviation	Analysis N
ATF-BC	3.66	.788	183
CETF-CF	3.51	.769	183
CPTF-CF	3.51	.825	183
FTF-BF	3.41	.813	183
RTF-BF	3.39	.869	183
C-CO	3.51	.797	183
O-CC	3.48	.818	183
C-CP	3.44	.815	183
CCR-CA	3.51	.844	183
UCUO-CO	3.42	.8	183

Extracted Method: Principal Component Analysis

Table 5. KMO & Bartlett Examination

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.779
Bartlett's Test of Sphericity	Approx. Chi-Square	311.736
	df	45
	Significance	.000

Extracted Method: Principal Component Analysis

Table 6. Communities

	Initial	Extraction
ATF-BC	1.000	0.54
CETF-CF	1.000	0.697
CPTF-CF	1.000	0.68
FTF-BF	1.000	0.72
RTF-BF	1.000	0.48
C-CO	1.000	0.728
O-CC	1.000	0.714
C-CP	1.000	0.495
CCR-CA	1.000	0.759
UCUO-CO	1.000	0.655

Extracted Method: Principal Component Analysis

Table 7. Total variance explained

Component	Initial Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative%	Total	% of Variance	Cumulative%
1	2.432	24.320	24.32	2.432	24.32	24.32
2	1.538	15.379	39.699	1.538	15.379	39.699
3	1.289	12.886	52.585	1.289	12.886	52.585
4	1.209	12.088	64.674	1.209	12.088	64.674
5	.911	9.112	73.786			
6	.767	7.673	81.458			
7	.600	6.002	87.461			
8	.499	4.990	92.451			
9	.399	3.990	96.441			
10	.356	3.559	100			

Extracted Method: Principal Component Analysis

Subsequently, Table 6 expresses the explained percentage of these main components (factors) to each ten evaluated criteria and in detail, the explained percentage of first main component was 24.32% ($\lambda_1 / \sum_{i=1}^{10} \lambda_i = 2.432 / 10 = 24.32\%$), the explained percentage of second main component was 15.38% ($\lambda_2 / \sum_{i=1}^{10} \lambda_i = 1.538 / 10 = 15.38\%$), the explained percentage of third main component was 12.89% ($\lambda_3 / \sum_{i=1}^{10} \lambda_i = 1.289 / 10 = 12.89\%$) and the explained percentage of fourth main component was 12.09% ($\lambda_4 / \sum_{i=1}^{10} \lambda_i = 1.209 / 10 = 12.09\%$). Particularly, the eigenvalue of second main component was smaller than 1 which means its explained percentage is definitely lower and for this reason, the number of main components are four.

Consequently, according to the measured loading of each ten evaluated criterion in component matrix of Table 7, C-CO (0.633), O-CC (0.62) and C-CP (0.604) are categorized into first main assessed group named as Course Content Operation (“CCO”); FTF-BF (0.81) and CETF-CF (0.605) are categorized into second assessed group labelled as Course Feedback and Evaluation Technological Function (“CFETF”); CPTF-CF (0.99), UCUO-CO (0.646) and CCR-CA (0.643) are categorized into third assessed group titled Course and User’s operation technological Function (“CUOTF”) and ATF-BC (0.656) and RTF-BF (0.479) tagged as Course Basic Technological Function (“CBTF”).

Measured step 2: Implementing ANP model

In association with the measured consequences of FA approach and TAW and ANP models, the brief research hierarchy was systematically expressed in Figure 2.

Table 8. Component matrix

	Components			
	1	2	3	4
C-CO	.633	-.268	-.416	.289
O-CC	.62	-.317	-.415	.238
C-CP	.604	-.355	-.064	-.025
RTF-BF	.475	.081	-.172	-.467
CPTF-CF	.509	.623	.099	-.151
CETF-CF	.402	.605	.055	.408
UCUO-CO	.43	-.225	.646	-.037
CCR-CA	.413	-.415	.643	-.041
FTF-BF	.439	.294	-.104	.656
ATF-BC	.295	.411	.236	.478

Extracted Method: Principal Component Analysis.

a. Extracted Four Factors

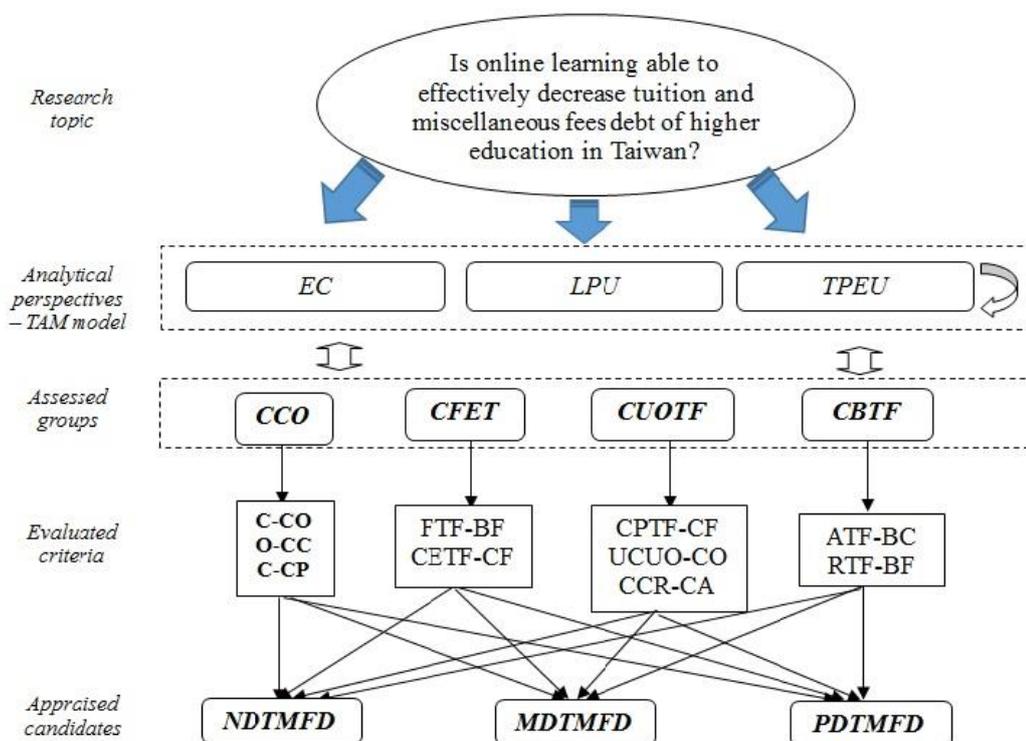


Figure 2. Brief research hierarchy of ANP model

Table 9. SCIN measurement of ANP model

Assessed group - Weights	Criteria	FA-communalities	NDTMFD		MDTMFD		PDTMFD				
			Weights	Evaluated Score	Weights	Evaluated Score	Weights	Evaluated Score			
CCO	0.4056	C-CO	0.728	0.3723	0.1099	0.2453	0.0724	0.738	0.2179		
		O-CC	0.714	0.1226	0.0355	0.2623	0.0760	0.5571	0.1613		
		C-CP	0.495	0.1560	0.0313	0.2106	0.0423	0.6196	0.1244		
CFET	0.2352	FTF-BF	0.72	0.0559	0.0095	0.5750	0.0974	0.653	0.1106		
		CETF-CF	0.697	0.1066	0.0175	0.2114	0.0347	0.6987	0.1145		
CUOTF	0.2034	CPTF-CF	0.68	0.2409	0.0333	0.1924	0.0266	0.237	0.0328		
		UCUO-CO	0.655	0.0845	0.0113	0.4172	0.0556	0.5485	0.0731		
		CCR-CA	0.759	0.1676	0.0259	0.3967	0.0612	0.6327	0.0977		
CBTF	0.1558	ATF-BC	0.54	0.4298	0.0362	0.2510	0.0211	0.6571	0.0553		
		RTF-BF	0.48	0.0669	0.0050	0.2438	0.0182	0.6893	0.0515		
SCI									0.1695	0.2718	0.5587

Subsequently, assessed measurements of ANP model is systematically applied in calculations of weight-questionnaire of fifteen experts, including five professors who have over 10-year teaching experience in education departments in Taiwanese HE, five corporate senior managers who have over 10-year working experience in various industries in Taiwan and five government officers who have over 5-year research experience in Taiwanese education research institutions. Consequently, Table 8 directly and distinctively points out that the highest evaluated score of Standardizing Comparative Index (“SCI”) of PDTMFD is 0.5589 through the hierarchal combined measurements of C.R. and C.I. and significantly, the evaluated criteria scores of C-CO (0.1099; 0.0724; 0.2179) in three appraised candidates are the highest weights scores.

Measured step 3: Administering fsQCA method

In order to enforce the research reliability and validity, fsQCA method of qualitative analysis was synthetically employed to testify the weighted-measured consequences of FA approach and ANP model through verified linear relations between a combination set of Xs (ten assessed criteria) and a combination set of Ys (three candidates). As for complex measurements of fsQCA method, ten criteria measured-weights of weights1-FA approach in PDTMFD and weights2-ANP model are considered a combination set “X (in)” and completely evaluated scores of PDTMFD’s SCI are considered a combination set of “Y (out)”. Consequently, measured results of fsQCA method are described in Figure 3 through the calculations of fsQCA statistic software.

Model: CMI=f(ten criteria EDTMFD’s measured-weights of weights1-FA approach and ten criteria EDTMFD’s measured-weights of weights2-ANP model)			
(f1)	raw coverage	unique coverage	consistency
ten criteria EDTMFD’s measured-weights of weights1-FA approach*ten criteria EDTMFD’s measured-weights of weights2-ANP model			
	0.975614	0.975614	1.000000
solution coverage: 0.975818			
solution consistency: 1.000000			
(f1)			

In Figure 3, the consistency (1.000000) and raw coverage (0.975614) both are the solution consistency and coverage which means the sample linear interrelations exists between verified linear relations between a combination set of Xs and a combination set of Ys. Based on the Boolean logit/probit model of fsQCA method, “ten criteria EDTMFD’s measured-weights of weights1-FA approach*ten criteria

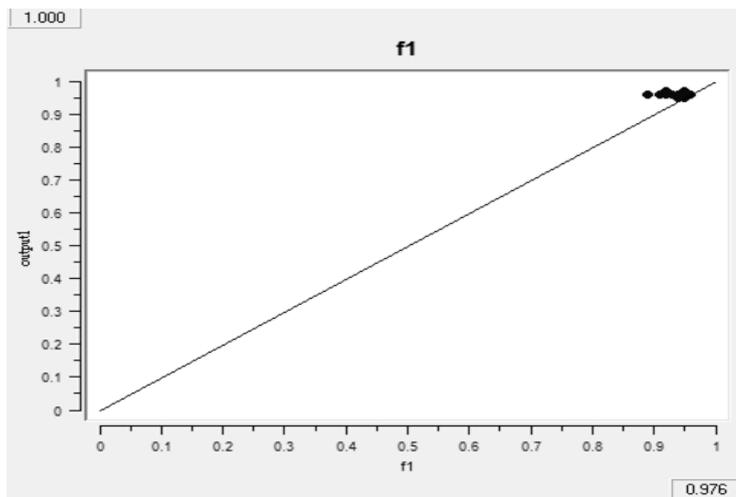


Figure 3. Measured results of fsQCA method

EDTMFD's measured-weights of weights2-ANP model" which means ten criteria EDTMFD's measured-weights of weights1-FA approach and ten criteria EDTMFD's measured-weights of weights2-ANP model have been distinctively associated with completely evaluated scores of EDTMFD's SCI.

CONCLUSION

With respect to a series of world's HE open policies with the higher-recruiting rate, more and more registering and graduated college students have been continuously suffering the huge TMFD pressure. In order to effectively diminish TMFD impacts for entire society, not only academic researchers but also empirical governments have devoted to find out the various solutions to directly HE students' TMFD pressure. For this reason, the online learning, in high-speed digitalization era coming, has become research mainstream to effectually TMFD because online learning is definitely able to overcome the time and space restrictions of traditional education style with a series of educational hardware and software costs and expenditures. Therefore, in order to refine the most potentially influenced determinants of online learning in order to effectively decrease tuition and miscellaneous fees debt of higher education, this research not only employs the analytical calculations of FA approach to assay weight-questionnaire measurements of random 183 valid questionnaires of 200 HE Taiwanese students but also applies the appraised measurements of TAM and ANP model to assess weight-questionnaire calculations of professional 15 experts to directly and apparently include the most valuable conclusion of this research is that "online learning is able to passively decrease Tuition and Miscellaneous Fee Debt (TMFD) in higher education (PDTMFD)". Specifically, as for the reinforcement of research reliability and validity, this result of fsQCA method directly induces that these most potentially influenced determinants of online learning (a combined set Xs) is positively associated with SCI scores (a combined set Ys) in evaluated candidate – EDTMFD.

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